

We claim,

1. A method for imaging tumor vasculature in a mammal, comprising:

5           a) administering to the mammal a composition which

comprises a molecule capable of detecting ephrin-B2

nucleic acid or polypeptide coupled to an imaging agent;

b) allowing the composition to accumulate at the tumor  
vasculature; and

c) detecting the accumulated composition so as to image  
the tumor vasculature.

2. The method of claim 1 wherein the ephrin-B2 and the molecule

capable of detecting ephrin-B2 are nucleic acids.

3. The method of claim 1 wherein the ephrin-B2 and the molecule

capable of detecting ephrin-B2 are polypeptides.

4. The method of claim 1 wherein the accumulated composition is

20 detected by a conventional scintillation camera, a gamma camera, a

rectilinear scanner, a PET scanner, a SPECT scanner, a MRI scanner, a

NMR scanner, an X-ray machine, or an infrared scanner machine.

5. The method of claim 1 wherein the imaging agent is a radionuclide or

25 a chelate.

6. A method of causing tumor cell death by targeting tumor

vasculature comprising administering to a mammal a composition which

comprises a molecule capable of detecting ephrin-B2 nucleic acid or polypeptide coupled to an agent capable of causing tumor cell death.

7. A method of causing vascular endothelial cell death by targeting  
5 tumor vasculature comprising administering to a mammal a composition  
which comprises a molecule capable of detecting ephrin-B2 nucleic acid or  
polypeptide coupled to an agent capable of causing vascular endothelial  
cell death.

8. The method of claim 6 wherein the ephrin-B2 and the molecule  
capable of detecting ephrin-B2 are nucleic acids.

9. The method of claim 7 wherein the ephrin-B2 and the molecule  
capable of detecting ephrin-B2 are nucleic acids.

10. The method of claim 6 wherein the agent capable of causing tumor  
cell death is carboplatin, cisplatin, vincristine, methotrexate, paclitaxel,  
docetaxel, 5-fluorouracil, UFT, hydroxyurea, gemcitabine, vinorelbine,  
irinotecan, tirapazamine, or matrilysin.

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11. The method of claim 6 wherein the ephrin-B2 and the molecule  
capable of detecting ephrin-B2 are polypeptides.

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12. The method of claim 7 wherein the ephrin-B2 and the molecule  
capable of detecting ephrin-B2 are polypeptides.

13. The method of claim 7 wherein the agent capable of causing  
vascular endothelial cell death is gelonin, ricin A, ricin B, saporin, bryodin

1, bryodin 2, momordin, pokeweed antiviral protein from seeds (PAP-S), trichokirin, or abrin.

14. The method of claim 1, 6, or 7 wherein the mammal is a human.

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15. The method of claim 1, 6, or 7 wherein the molecule capable of detecting ephrin-B2 polypeptide is a monoclonal antibody, an antibody fragment, or a single chain fv.

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16. The method of claim 1, 6, or 7 wherein the molecule capable of detecting ephrin-B2 polypeptide is an EphB1-Fc, EphB2-Fc, EphB3-Fc, or EphB4-Fc receptorbody polypeptide or an EphB1-Fc, EphB2-Fc, EphB3-Fc, or an EphB4 receptor fragment polypeptide containing an ephrin-B2 binding domain.

17. The method of claim 1, 6, or 7 wherein the composition is administered to a mammal with a carrier suitable for parenteral administration.

20 18. The method of claim 17 wherein the mammal is a human.

19. The method of claim 2, 8, or 9 wherein the molecule capable of detecting ephrin-B2 nucleic acid is an mRNA.

25 20. The method of claim 2, 8, or 9 wherein the molecule capable of  
detecting ephrin-B2 nucleic acid is a synthetic oligonucleotide.

21. The method of claim 3, 11, or 12 wherein the molecule capable of detecting ephrin-B2 polypeptide is a synthetic polypeptide.

22. A kit for imaging tumor vasculature in a mammal comprising a composition which comprises a molecule capable of detecting ephrin-B2 nucleic acid or polypeptide coupled to an imaging agent.

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23. The kit of claim 22 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are nucleic acids.

10 24. The kit of claim 22 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are polypeptides.

15 25. A kit for targeting tumor vasculature in a mammal comprising a composition which comprises a molecule capable of detecting ephrin-B2 nucleic acid or polypeptide coupled to an agent capable of causing tumor cell death.

20 26. A kit for targeting tumor vasculature in a mammal comprising a composition which comprises a molecule capable of detecting ephrin-B2 nucleic acid or polypeptide coupled to an agent capable of causing vascular endothelial cell death.

25 27. The kit of claim 25 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are nucleic acids.

28. The kit of claim 26 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are nucleic acids.

29. The kit of claim 25 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are polypeptides.

30. The kit of claim 26 wherein the ephrin-B2 and the molecule capable of detecting ephrin-B2 are polypeptides.

5 31. The kit of claim 22, 25, or 26 wherein the molecule capable of detecting ephrin-B2 polypeptide is a monoclonal antibody, an antibody fragment, and a single chain fv.

10 32. The kit of claim 22, 25, or 26 wherein the molecule capable of detecting ephrin-B2 polypeptide is an EphB4-Fc receptorbody polypeptide or an EphB4 receptor fragment polypeptide containing an ephrin-B2 binding domain.

15 33. The kit of claim 22, 25, or 26 wherein the composition is administered to a mammal with a carrier suitable for parenteral administration.

34. The kit of claim 33 wherein the mammal is a human.

20 35. The kit of claim 23, 27, or 28 wherein the molecule capable of detecting ephrin-B2 nucleic acid is an mRNA.

36. The kit of claim 23, 27, or 28 wherein the molecule capable of detecting ephrin-B2 nucleic acid is a synthetic oligonucleotide.

25 37. The kit of claim 24, 28, or 30 wherein the molecule capable of detecting ephrin-B2 polypeptide is a synthetic polypeptide.

38. A method of delivering an agent to the vasculature of a mammal comprising administering to the mammal a composition which comprises a molecule capable of localizing to a cell expressing ephrinB2 polypeptide, wherein the molecule is coupled to the agent.

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39. The agent of claim 38 which is capable of stimulating angiogenesis.

40. The agent of claim 38 which is capable of preventing restenosis of a blood vessel.

41. The agent of claim 38 which is capable of dissolving a blood clot in a blood vessel.

42. The agent of claim 38 which is capable of reducing atherosclerotic plaques.